

Application No. 10/743,458
February 7, 2007
Reply to the Office Action dated November 9, 2006
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AMENDMENTS TO THE DRAWINGS:

The attached sheet of Drawings includes new Fig. 19.

REMARKS/ARGUMENTS

Claims 1-24, 31, and 32 are pending in this application. By this Amendment, Applicants AMEND the Specification, the Drawings, and claims 1-24; CANCEL claims 25-30, and ADD new claims 31 and 32.

Claims 25-30 have been canceled since these claims are directed to a non-elected invention. Applicants reserve the right to file a Divisional Application in order to pursue prosecution of non-elected claims 25-30.

The Drawings were objected to for allegedly failing to show every feature of the invention specified in the claims. Applicants have submitted new Fig. 19 to show all of the features recited in original claims 23 and 24 and new claims 31 and 32. Applicants' undersigned respectfully submits that no new matter has been entered as new Fig. 19 only shows features that were clearly disclosed in the original Specification and claims.

With respect to the features recited in claim 4, Fig. 14A shows the valley (106) provided on the left side of the connecting rod and Fig. 14B shows the bearing locking grooves (101h) provided on the right side of the connecting rod at a position of the crank-pin hole opposite to, that is, diametrically across from, the valley (106). Note that Fig. 14B is a cross sectional view of the right side of the connecting rod along line XI-XI in Fig. 14A. Accordingly, Applicants respectfully submit that all of the features recited in claim 4 are illustrated in the drawings. Applicants respectfully request reconsideration and withdrawal of the objection to the Drawings.

Claims 1-24 were rejected under 35 U.S.C. § 112, second paragraph as allegedly being indefinite. Claims 1-24 have been amended to correct the informalities noted by the Examiner. Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejection of claims 1-24 under 35 U.S.C. § 112, second paragraph.

Claims 1, 2, 7-12, 14, 15, and 23 were rejected under 35 U.S.C. § 102(b) as being anticipated by Mukai et al. (U.S. 4,693,139). Claims 1, 9, 10, and 13 were rejected under 35 U.S.C. § 102(b) as being anticipated by Applicants' Admitted Prior Art (AAPA). Claims 1-3, 7-10, 14, and 15 were rejected under 35 U.S.C. § 102(b) as being

anticipated by Spurny (U.S. 6,125,536). Claims 1, 2, 4-10, 14-20, and 23 were rejected under 35 U.S.C. § 102(b) as being anticipated by Ishida et al. (U.S. 6,312,159). Claim 24 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Mukai et al., Spurny, or Ishida et al.

Claims 1, 2, 4, 5, 7-10, 14-20, 23, and 24 were alleged to be directed to an invention not patentably distinct from claims 1-22 of commonly assigned U.S. Patent Application No. 10/743,457. Claims 1, 2, 4, 5, 7-10, 14-20, 23, and 24 were provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-22 of copending U.S. Patent Application No. 10/743,457.

In accordance with the Examiner's suggestion, Applicants state in the accompanying Statement under 35 U.S.C. § 103(c) that the present application and U.S. Patent Application No. 10/743,457 were commonly owned or subject to an obligation of assignment to the same person at the time the invention of the present invention was made. Applicants also respectfully submit that the amendments to claim 1 have overcome the provisional rejection on the ground of nonstatutory obviousness-type double patenting because claims 1-22 of copending U.S. Patent Application No. 10/743,457 do not teach all of the features recited in amended claim 1 of the present application.

Accordingly, Applicants respectfully request reconsideration and withdrawal of the provisional rejection of claims 1, 2, 4, 5, 7-10, 14-20, 23, and 24 on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-22 of copending U.S. Patent Application No. 10/743,457.

Although the Examiner did not specifically indicate that claims 21 and 22 would be allowable if rewritten in independent form to include all of the features of the base claim and any intervening claims, since claims 21 and 22 were not rejected over any prior art, Applicants assume that claims 21 and 22 would be allowable if rewritten in independent form to include all of the features of the base claim and any intervening claims. Accordingly, Applicants have rewritten claim 21 to be in independent form to

include all of the features of the base claim and any intervening claims.

Applicants respectfully traverse the rejections of claims 1-20, 23, and 24.

Claim 1 has been amended to recite:

A split connecting rod comprising:
a crank-pin hole;
a valley provided on an inner circumferential surface of the crank-pin hole; and
a fracture starting point groove provided at the base portion of said valley; wherein

upper and lower inner surfaces of the fracture starting point groove define an angle of about 10 degrees or less with respect to a predetermined fracture plane passing from a shaft center of the crank-pin hole through a bottom portion in a bottom surface of the fracture starting point groove; and

the valley defines an angle with respect to the predetermined fracture plane greater than the angle that the upper and lower inner surfaces form with respect to the predetermined fracture plane.

(emphasis added)

With the unique combination and arrangement of features recited in Applicants' claim 1, including the features of "upper and lower inner surfaces of the fracture starting point groove define an angle of about 10 degrees or less with respect to a predetermined fracture plane passing from a shaft center of the crank-pin hole through a bottom portion in a bottom surface of the fracture starting point groove" and "the valley defines an angle with respect to the predetermined fracture plane greater than the angle that the upper and lower inner surfaces define with respect to the predetermined fracture plane," Applicants have been able to provide a split type connecting rod that is capable of preventing problems such as peeling or falling during fracturing/splitting and securing alignment accuracy after the fracturing, thus further shortening the processing time required for processing grooves and improving processing accuracy (see, for example, the second full paragraph on page 3 in Applicants' originally filed Specification).

The Examiner alleged that each of Mukai et al., AAPA, Spurny, and Ishida et al. teaches all of the features recited in Applicants' claim 1.

Applicants' claim 1 has been amended to recite the features of "upper and lower inner surfaces of the fracture starting point groove define an angle of about 10 degrees or less with respect to a predetermined fracture plane passing from a shaft center of the crank-pin hole through a bottom portion in a bottom surface of the fracture starting point groove" and "the valley defines an angle with respect to the predetermined fracture plane greater than the angle that the upper and lower inner surfaces define with respect to the predetermined fracture plane." Support for these features is found, for example, in the first two full paragraphs on page 20 in Applicants' originally filed Specification and Fig. 6A in Applicants' originally filed Drawings.

The Examiner alleged that Mukai et al. teach a valley (11, 12) and a fracture starting point groove (left most portion of the valley in Fig. 6 of Mukai et al.) wherein a width of the fracture starting point groove is less than a width of the valley. However, Mukai et al. specifically teach that the upper and lower surfaces (11₁, 12₁) of the fracture starting point groove form an angle θ_1 of "45° to 50°, preferably 50°" and that the surfaces (11₂, 12₂) of the valley form an angle θ_2 of "90° to 110°, preferably 110°" (see, for example, lines 44-47 in column 3 of Mukai et al.). Since Mukai et al. disclose that the angle θ_1 extends from the upper surface to the lower surface of the fracture starting point groove, the angle from the upper/lower surface to the fracture plane is half of the angle θ_1 , i.e., 22.5° to 25°.

Thus, Mukai et al. clearly fail to teach or suggest the features of "upper and lower inner surfaces of the fracture starting point groove define an angle of about 10 degrees or less with respect to a predetermined fracture plane passing from a shaft center of the crank-pin hole through a bottom portion in a bottom surface of the fracture starting point groove" and "the valley defines an angle with respect to the predetermined fracture plane greater than the angle that the upper and lower inner surfaces define with respect to the predetermined fracture plane," as recited in Applicants' claim 1.

The Examiner alleged that AAPA shows, in Figs. 1A and 1B, a valley (51) and a fracture starting point groove provided at the base portion of the valley, wherein upper and lower surfaces of the fracture starting point groove form an angle of about 0° with

respect to a predetermined fracture plane. However, the valley (51) and the fracture starting point groove shown in Applicants' Figs. 1A and 1B have the exact same angle (i.e., 0°) with respect to the fracture plane since the valley and the fracture starting point groove are essentially the same.

Thus, AAPA clearly fails to teach or suggest the features of "upper and lower inner surfaces of the fracture starting point groove define an angle of about 10 degrees or less with respect to a predetermined fracture plane passing from a shaft center of the crank-pin hole through a bottom portion in a bottom surface of the fracture starting point groove" and "the valley defines an angle with respect to the predetermined fracture plane greater than the angle that the upper and lower inner surfaces define with respect to the predetermined fracture plane," as recited in Applicants' claim 1.

The Examiner alleged that Spurny teaches a valley (13) and a fracture starting point groove provided at the base portion of the valley, wherein a width of the fracture starting point groove is less than a width of the valley. However, the fracture starting point groove of Spurny appears to form a large angle (e.g., 35° to 45°) with respect to a predetermined fracture plane, and the fracture starting point groove and the valley (13) shown in Fig. 3 of Spurny have the exact same angle with respect to the fracture plane since the valley is merely an extension of the fracture starting point groove. That is, the surfaces of the valley extend at the same angle as the surfaces of the fracture starting point groove with respect to the fracture plane.

Thus, Spurny clearly fails to teach or suggest the features of "upper and lower inner surfaces of the fracture starting point groove define an angle of about 10 degrees or less with respect to a predetermined fracture plane passing from a shaft center of the crank-pin hole through a bottom portion in a bottom surface of the fracture starting point groove" and "the valley defines an angle with respect to the predetermined fracture plane greater than the angle that the upper and lower inner surfaces define with respect to the predetermined fracture plane," as recited in Applicants' claim 1.

The Examiner alleged that Ishida et al. teach a valley (21) and a fracture starting point groove provided at the base portion of the valley, wherein a width of the fracture

starting point groove is less than a width of the valley. The Examiner also alleged in paragraph 10 on page 8 of the outstanding Office Action that Ishida et al. teach a valley including sloped portions (5a, 5b, 6a, 6b). However, the Examiner did not identify what features of Ishida et al. allegedly correspond to the fracture starting point groove when the valley corresponds to the sloped portions (5a, 5b, 6a, 6b) of Ishida et al.

First, Ishida et al. disclose that the valley (21) is provided with a “V-shaped notch cross section” (see, for example, lines 10-12 in column 9 of Ishida et al.). Accordingly, the fracture starting point groove in this embodiment of Ishida et al. is also a V-shaped notch since the Examiner alleged that the fracture starting point groove is the base portion of the valley. Thus, the valley (21) and the corresponding fracture starting point groove of Ishida et al. are very similar to the valley (13) and the corresponding fracture starting point groove of Spurny. That is, the valley and the fracture starting point groove of Ishida et al. have the exact same angle with respect the fracture plane since the valley is merely an extension of the fracture starting point groove.

Second, the sloped portions (5a, 5b, 6a, 6b) of Ishida et al., which the Examiner alleged correspond to the valley recited in Applicants’ claim 1, are actually bearing locking grooves. Furthermore, the Examiner did not specifically indicate what features allegedly correspond to the fracture starting point groove. In order to advance prosecution, it will be assumed that the fracture starting point groove is the base portion of the sloped portions (5a, 5b, 6a, 6b) of the valley of Ishida et al. As seen in Figs. 1 and 2 of Ishida et al., the sloped portions (5a, 5b, 6a, 6b) of the valley are rounded such that the base portion of the valley is substantially vertical, that is, the fracture starting point groove forms an angle of about 90° with respect to the predetermined fracture plane.

Thus, Ishida et al. clearly fail to teach or suggest the features of “upper and lower inner surfaces of the fracture starting point groove define an angle of about 10 degrees or less with respect to a predetermined fracture plane passing from a shaft center of the crank-pin hole through a bottom portion in a bottom surface of the fracture starting point groove” and “the valley defines an angle with respect to the predetermined fracture

plane greater than the angle that the upper and lower inner surfaces define with respect to the predetermined fracture plane,” as recited in Applicants’ claim 1.

Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejections of claim 1 under 35 U.S.C. § 102(b) as being anticipated by each of Mukai et al., AAPA, Spurny, and Ishida et al.

In view of the foregoing amendments and remarks, Applicants respectfully submit that claims 1 and 21 are allowable. Claims 2-20, 31, and 32 depend upon claims 1 and 21, and are therefore allowable for at least the reasons that claims 1 and 21 are allowable.

In view of the foregoing amendments and remarks, Applicants respectfully submit that this application is in condition for allowance. Favorable consideration and prompt allowance are solicited.

The Commissioner is authorized to charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 50-1353.

Respectfully submitted,

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